

**MACHAKOS UNIVERSITY**  
**SCHOOL OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT: CIT**  
**UNIT NAME: DATABASE ADMINISTRATION**  
**UNIT CODE: SIT 301**  
**SEMESTER: .....**

**DATE:**

**TIME: 2 HOURS**

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**INSTRUCTIONS:**      **Answer Question ONE and Any Other TWO Questions.**

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**QUESTION ONE [30 MARKS]**

- a) Explain the following types of functional dependencies in normalization;
  - i) Partial dependency (2 marks)
  - ii) Transitive dependency (2 marks)
- b) Discuss any three database basic recovery facilities used in the restoration of a database in case of a failure (6 marks)
- c) Explain the meaning of transaction in database administration (2 marks)
- d) Explain the SQL syntax of ;
  - i) CREATE TABLE (2 marks)
  - ii) UPDTE record (2 marks)
- e) Describe two types of database security features provided by DBMS (4 marks)
- f) Describe the following database design processes;
  - i) Physical design (3 marks)
  - ii) Logical design (3 marks)
- g) Explain the difference between a data administrator and database administrator (4 marks)

**QUESTION TWO [20 MARKS]**

- (a) Illustrate the structure of a typical DBMS based on the relational data model [5 marks]
- (b) Explain briefly the five major components of the database system environment [5 marks]
- (c) Explain the following categories of SQL functions;
  - i) Data Definition Language (DDL) (2 marks)
  - ii) Data Manipulation Language (DML) (2 marks)
- (d) Describe the following types of attributes in ER modeling and give an example for each.
  - i. Primary key (3 Marks)
  - ii. Candidate key (3 Marks)

### **QUESTION THREE [20 MARKS]**

- (a) Enumerate the key roles of a data administrator [6 marks]
- (b) With an aid of a state transition diagram, outline the states for transaction execution in a transaction processing. [6 marks]
- (c) Distinguish between the following in relation to database architecture.
  - i. decentralized database vs Distributed database [4 marks]
  - ii. Client-server database vs Parallel database [4 marks]

and distributed database systems

### **QUESTION FOUR [20 MARKS]**

- (a)
  - (i) Explain the concept of transaction in relation to DBMS [2 marks]
  - (ii) Discuss Three cases that may cause a transaction to fail [6 marks]
- (b) Explain four limitations of file based systems that gave rise to the database system. [4 marks]
- (c) Describe the ACID transaction properties (6 marks)
- (d) Give two examples of database threats and the possible impacts they may have on the database. (2 marks)

### **QUESTION FIVE [20 MARKS]**

- (a) With an aid of an example explain the purpose of Concurrency Control in database administration. [6 marks]
- (b) Giving example in each case, explain the following relational algebra operators as used in DBMS. [6 marks]
  - i. **project:**  $\Pi$
  - ii. **select:**  $\sigma$
  - iii. **union:**  $\cup$
- (c) One of the functions of a DBA is administration and management of physical database. Describe the areas of concern as far as administration and management of the physical database that the DBA carries out [8 marks]